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MARITAL FERTILITY AND EDUCATIONAL ASSORTATIVE MATING BEFORE, DURING, AND AFTER THE BABY BOOM IN BELGIUM

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Abstract

Over the course of the 20th century, the expansion of female participation in education and the gradual re-entrance of women into the labour market changed the dynamics of union formation and fertility. After the Baby Boom period, the association between wealth or social status on the one hand and fertility on the other was turned around. In the meantime, educational attainment became a key determinant of fertility. In this paper we investigate the relation between educational assortative mating and marital fertility. We focus on the fertility trends during the Baby Boom and subsequent Baby Bust, which have been shown to be related to changes in marriage patterns. More particularly, we investigate how changes in the timing and quantum of marital fertility were related to the changing combination of his and her educational attainment. We adopt a couple-oriented approach and use retrospective Belgian census data with rich information on educational attainment and marriage and childbearing histories, which allows us to use event history analysis to analyse fertility of the relevant birth cohorts. Results show that couples where both partners are poorly educated experienced the highest fertility among most of the Baby Boom producing birth cohorts. Hypergamous couples (husband more educated than wife) were not far behind, and their fertility levels even exceeded the levels of the low-educated couples among some birth cohorts. Highly educated homogamous couples had slightly lower fertility than hypergamous couples. Hypogamy (husband less educated than wife) was clearly associated with lower fertility, even among the younger cohorts. The increasing prevalence of hypogamy during the Baby Bust could thus be one factor contributing to the fertility decline.

Introduction

Around the middle of the 20th century, the fertility decline that many Western countries had been experiencing since the second half of the 19th century was interrupted by a temporary surge in birth rates: the Baby Boom. Since it involved increasing fertility levels, it was as if the demographic transition was briefly resisted, before returning to sometimes rapidly decreasing fertility levels in the 1970s and 1980s. Classical explanations of the Baby Boom focus on the post-World War II optimism and economic boom as driving factors. However, recent research pointed out that these explanations fall short, as the recovery of fertility started already during or even before the war in many countries (Van Bavel & Reher, 2013). As a result, is it still not entirely clear what are the main drivers behind the Baby Boom. What is abundantly clear, however, is that it involved two demographic trends. On the one hand there was an acceleration of the shift to earlier transition into marriage and parenthood (Hajnal, 1953). On the other hand there was also an increase of the quantum of fertility (Bean, 1983; Van Bavel et al., 2015). More people had children, and more people had more than one child. The quantum increase is perhaps the most puzzling element of the Baby Boom as it seems at odds with other developments at the time, including the educational expansion (Van Bavel 2014).

In the Baby Boom era, marriage was maybe more than ever the prime context for having children (Coontz, 2005). On the surface at least, conformism and uniformity were leading people to a nuclear family with traditional norms and values and a sexual division of labour – male breadwinner, female homemaker — that had probably never been as strong (Janssens, 1997). Still, there was something on the move within the institute of marriage. Gender relations were at the verge of major changes (Goldscheider, Bernhardt, & Lappegard, 2015). The educational expansion was well underway, and education was increasingly becoming an important determinant of socio-economic structure and particularly a key issue in partner selection (Breen, 2010).

The expansion of education is particularly interesting to look at since increased access to higher education for men and especially for women is generally associated with the postponement of parenthood and with low fertility. This is exactly the opposite of what happened during the Baby Boom era, when having more children at a younger age went hand in hand with increased participation in secondary and tertiary education (Ronsijn, 2014). Recently Van Bavel (2014) and Sandström (2014) have looked into the educational gradient of fertility for women during the Baby Boom era, finding that the educational penalty on fertility decreased during the Baby Boom years. A more comprehensive account which investigates both male and female educational effects is however still lacking. As female educational attainment and female economic roles were changing, so were male patterns (Butz & Ward, 1979; Macunovich, 1995; Oppenheimer, 1994). While women had to give up work on the labour market in order to take care of the household and the children, men were increasingly becoming the sole breadwinner in a labour market where

education was becoming increasingly important (Janssens, 1997). When women started to re-enter the labour market, the balance between husband and wife started changing again (Goldin, 2006). It is therefore interesting not only to simply include male educational characteristics, but to look at the role of the particular combinations of husband and wife's educational attainment in union formation processes during the Baby Boom and Baby Bust era. People do not find a partner randomly, but select a partner given certain preferences and constraints. Assortative mating, as this phenomenon is called, basically organizes people into families as it determines the matches that come out of the marriage market, and is consequently of considerable interest if we want to understand fertility trends (Schwartz, 2013).

Marriage was thus at a crossroads, and so this paper makes the married couple the central unit of analysis. It looks at how changing marriage patterns due to the changing distribution of educational attainment influences marital fertility patterns. More precisely, this paper investigates the link between the matching (or the lack thereof) of his and her educational levels on the one hand and dynamics of marital fertility on the other, using retrospective census data of the 1981 and 2001 Belgian census. In the first section we will illustrate three key trends of interest for this paper: the Belgian Baby Boom and Baby Bust, the changing educational distribution and the changing pattern of assortative mating in this period. Next we will discuss the potential mechanisms behind a possible connection between educational assortative mating and fertility, and we will present the data and methods that will be used to investigate this.

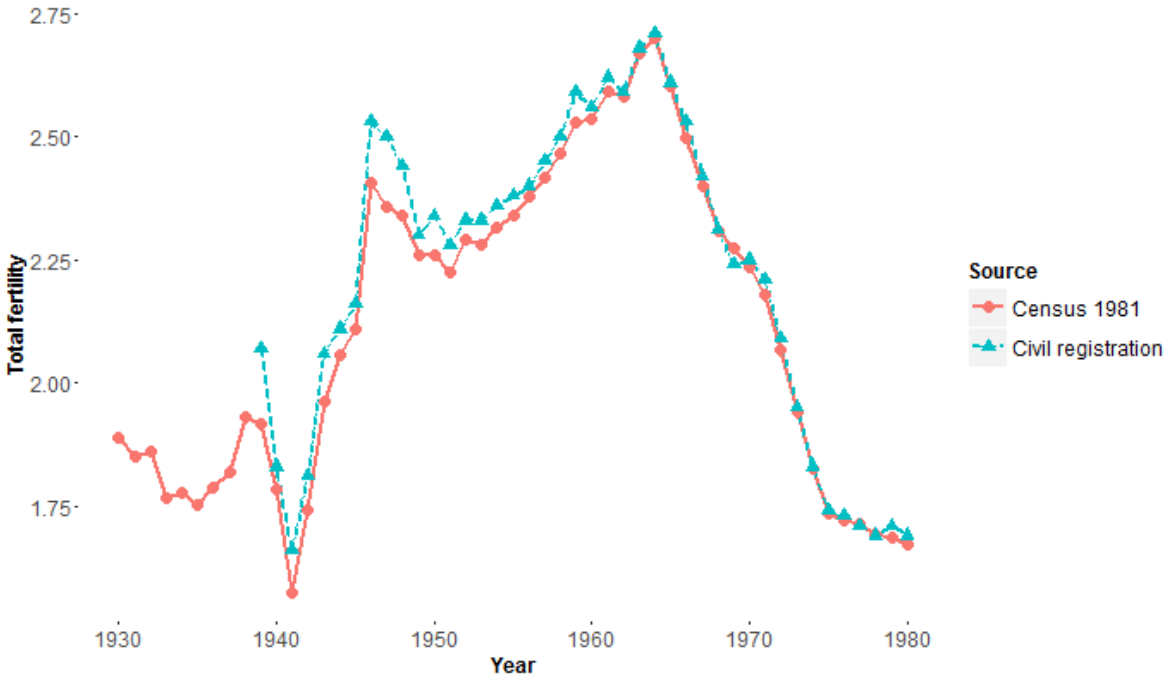
Background

The recovery of fertility in Belgium started around 1935 and, while temporarily interrupted by the first years of World War II, continued until 1964, after which a steady decline was initiated that brought fertility back to its pre-war level in the 1970s. Figure 1 shows the trends in the period total fertility rate during this era. We include a time-series based on civil registration (Matthijs & Bosscher, 1991) as a rough validation of our own 1981 Census based, retrospective calculations.. While both series match closely, the census estimates are consistently slightly below the vital registration total fertility rates, and this bias is a bit larger further back in time. This may be due to underreporting, which increases with old age, and to selective survival (Van Bavel, 2013).

Van Bavel and Reher (2013) show that the Belgian case is rather typical: the turnaround started earliest in the Nordic countries, that is, in mid-1933 in Denmark and Finland, mid-1934 in Sweden, and by the end of 1935 in Norway. Like in Belgium, the decline of fertility stopped in 1935 in France and England and Wales. The fact that the turning point in the total fertility rate was well before the war is an important indication that the classical interpretation of the baby boom as the result of post-war optimism and the economic boom of the 1950s and 1960s is insufficient. In some cases, the recovery of fertility was interrupted when the war broke out. Apart from Belgium,

this was for example the case in France in 1940, following the declaration of war in September 1939. After 1942, fertility began rising rapidly in many countries. In general the intensity of the baby boom in Belgium was rather low, compared to for example the United States or Canada and to a lesser extent France and The Netherlands (Van Bavel & Reher, 2013).

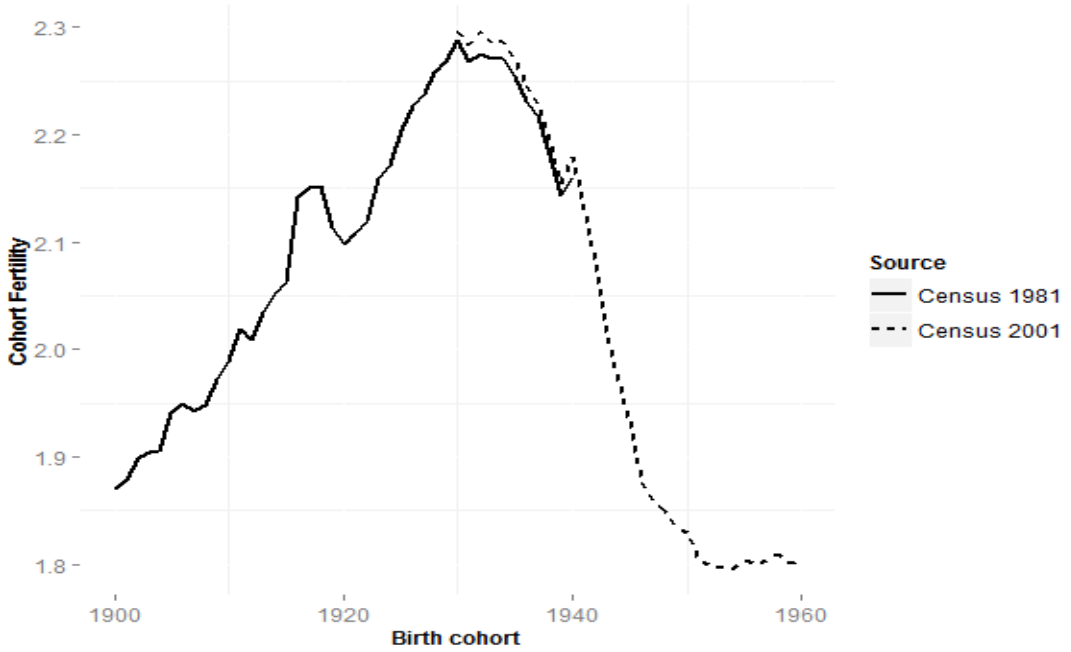
Figure 1: Period total fertility rates 1930-1980



Source: Belgodata (Matthijs & Bosscher, 1991) *and ADSEI (FOD Economie), Bevolkingsstatistieken; Belgian census 1981, own calculations*

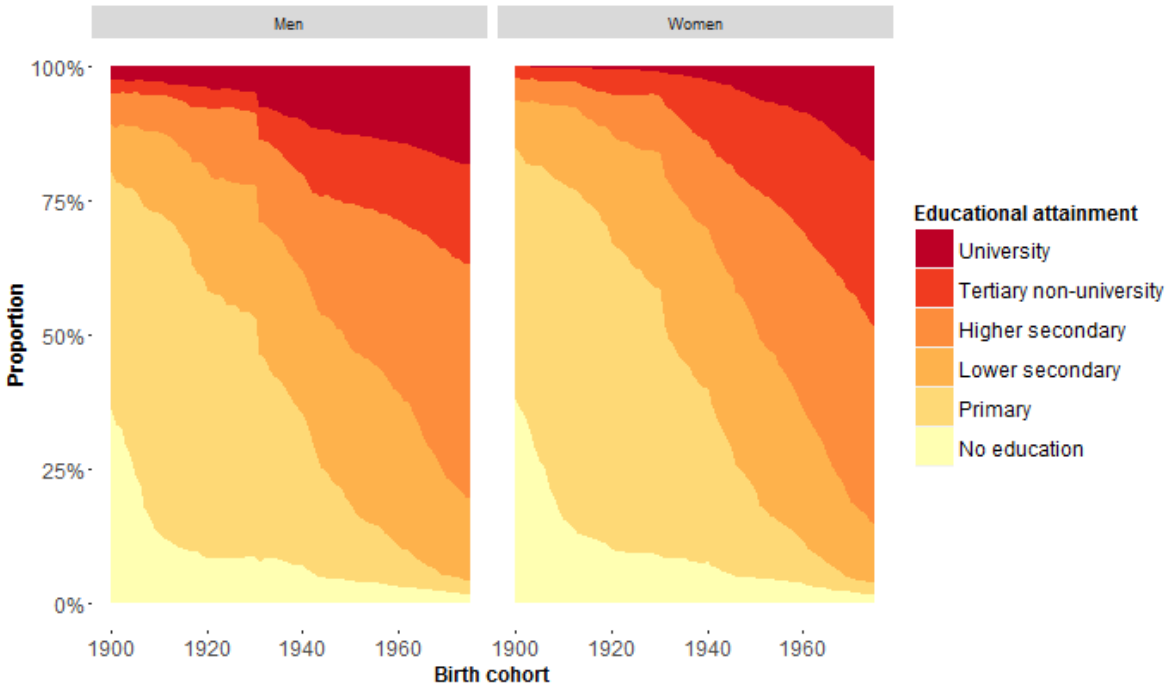
In Figure 2 we see the cohort fertility for generations born between 1900 and 1960. The clear inverted u-shape further substantiates the claim that the Baby Boom was more than a timing effect. It was more than recuperation of postponed births of the depression and war years resulting in higher period rates: there was a clear increase of fertility quantum over cohorts spanning 30 years. Each birth cohort between 1900, when cohort fertility was well below replacement levels (Van Bavel, 2010) and 1930, when it reached its peak of about 2.3 children per woman, had indeed higher fertility than the previous one. The only exceptions are women born right after World War I, who reached their reproductive years during the first years of the Second World War. For generations born after 1940, fertility decreased fairly quickly back to below-replacement levels.

Figure 2: Cohort total fertility rates of women born between 1900 and 1960



Source: Belgian censuses of 1981 and 2001, own calculations, see also Van Bavel & Reher, 2013.

Figure 3: Evolution of the educational distribution for men and women born between 1900 and 1975



Source: Belgian censuses of 1981 and 2001, own calculations, see Nomes & Van Bavel (2015)

The expansion of participation in education is one of the main social changes of the 20th century in the Western world, a change in which Belgium, although lagging behind somewhat compared to its neighbouring countries, participated as well (Nomes & Van Bavel, 2015; Ronsijn, 2014).

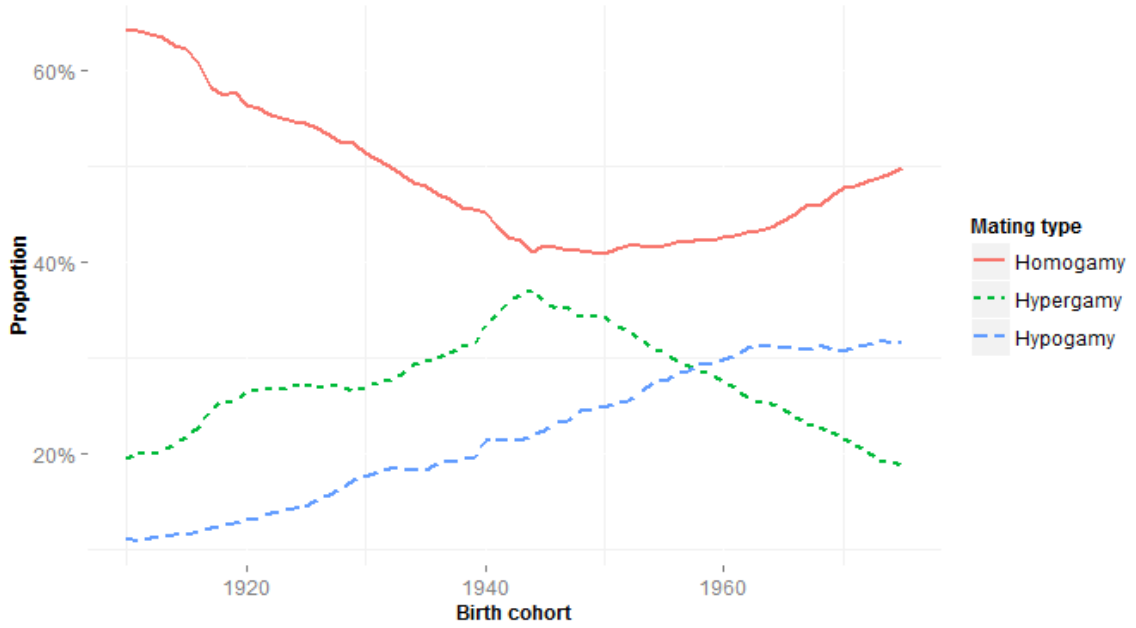
Figure 3 shows the cohort trends in educational attainment for both men and women. The expansion in education throughout the 20th century stands out. For generations born at the beginning of the century, who went to school during the time it finally became compulsory for all Belgian children until the age of 14, completing education beyond the primary school was exceptional, both for men and women (De Vroede, 1970). Only 4% of men born in the first decade of the 20th century and 2% of women completed tertiary education. Higher relative wages and more job security for the relatively highly educated started nonetheless to drive up demand for higher education (Duchesne & Nonneman, 1998). As a rather crude approximation of this evolution, we can look at the relative wages of blue- and white-collar workers. Between 1951 and 1960, wages of blue collar workers dropped from 54% to 51% compared to the wage of white-collar workers (Belgische Econmische Statistieken 1950-1960, own calculations). In the generations born around the middle of the century, who would go to produce the Baby Bust (1940-1960), the number of men and women with tertiary education had already increased to 18% and 17% respectively. For the generations responsible for the Baby Boom (1910-1940), however, the main shift occurs between primary and secondary education: among the oldest cohorts, about 80% of men and women had at most finished primary education, among the youngest Baby Boom producing generations, this was down to less than 25% for men and less than 35% for women.

A crucial element is that the educational expansion did not happen at the same time and with the same speed for men and women (Nomes & Van Bavel, 2015). Men took a head start and women had to catch up, which has important consequences for the balance within couples. A key result from sociological research is that “like marries like” in terms of social and educational background (Kalmijn, 1998; Schwartz, 2013; Van de Putte, 2005; van Leeuwen, Maas, & Miles, 2005). While parental social class background continues to play an important role in patterns of assortative mating, education has emerged as an increasingly important social dimension in the union formation process (Schwartz & Mare, 2005; 2012). This reflects the growing significance of educational attainment in modern society and modern economies in general. In the modern economy, the training expected to gain access to occupational positions has increasingly become school-based rather than family based (Weber, 1946).

Figure 4 shows the evolution of the proportion of educationally homogamous (spouses have the same educational attainment), hypergamous (the husband is higher educated than the wife) and hypogamous (the husband is lower educated than the wife) marriages. In all cohorts, homogamy remained most common. In all except the most recent cohorts, hypergamy came second, with hypogamy the least common pattern. Among the Baby Boom producing generations, homogamy was on the decline while both hyper- and hypogamy were getting increasingly more common. Women tended to marry men who are at least as highly educated as themselves. Among the Baby Bust producing cohorts, homogamy was on the rise again, while hypergamy started to decline.

While homogamy reached its low point among cohorts born in the 1940s, hypergamy reached its high point, yet even among these cohorts, when traditional values and male breadwinner model stood strong, hypogamy was far from unusual. Among generations born by the end of the 1950s, hypogamy become more common than hypergamy.

Figure 4: Marriages by assortative mating type, birth cohorts 1910 -1975



Source: Belgian censuses of 1981 and 2001, own calculations, see Nomes & Van Bavel (2015)

Theoretical framework

We have seen that there were considerable shifts in the prevalence of the types of educational assortative mating during the Baby Boom and Baby Bust era. We expect that the changing combinations of the educational attainment of husband and wife were related to changing fertility dynamics for several reasons. On the one hand there are certain causal mechanisms which might explain how different combinations of educational attainment could lead to distinctive marital fertility patterns, either directly through differences in fertility decisions, or indirectly through differences in marriage timing. On the other hand there is a distinct possibility that selection effects play an important role in the association between educational assortative mating and fertility.

Firstly, educational attainment is an important determinant of the monetary contribution of each partner to the household budget. Higher education enhances the income potential, which could both have a positive income effect on fertility, as child rearing is expensive, and a negative effect, since higher wages imply higher opportunity costs when having children negatively affects labour market activity (Kravdal & Rindfuss, 2008). Given the wage gap between men and women and the different expectations for involvement in housework and child rearing, the resulting effect of educational attainment on fertility strongly differs by gender (Becker, 1981). It is therefore

important to consider both the educational attainment of the husband and the wife. Moreover, the educational attainment of the husband could influence the effect on fertility of the educational attainment and the corresponding income potential of the wife, and vice versa. If both partners are highly educated, the opportunity cost for having children might have a smaller effect on childbearing decisions, as the household might be able to cope with the income of just one partner, or the combined income may be high enough for outsourcing child care, for example by hiring a nanny. Consequently, each particular combination of educational attainment of husband and wife could lead to a particular pattern of marital fertility.

A second, more indirect way in which educational assortative mating might influence marital fertility is related to the timing of marriage. Earlier transition into marriage and parenthood is associated with a higher total number of children (Berrington, Stone, & Beaujouan, 2015; Sobotka, 2003), not only because people who are prone to marry early tend to want to have more children, but also because women's fecundity declines with age. Higher education is generally associated with later transition into marriage, especially for women (Becker & Lewis, 1974; Gangadharan & Maitra, 2001). Not only do the higher educated spend more time in school, increased education opens up economic alternatives to getting married and raising children, which increases women's utility of being single compared to the utility of being married (Becker, 1974). The particular combination of educational attainment of a potential husband and wife here too could play a role. The theory of marriage timing developed by Oppenheimer (1988) suggest how this could be the case. Since men and women compete as they seek partners, a market in marriages can be presumed to exist (Becker, 1974). Each person tries to find a partner with the best possible set of characteristics, including education, given certain preferences and given certain restrictions imposed by market conditions. Since preferences depend on prevailing gender roles, the optimal outcome with respect to education of this process of assortative mating will have changed as female higher education and labour market participation increased. Furthermore, finding the "right" partner takes time while changing market conditions, i.e. a changing socio-economic context, can facilitate or hinder the search (Kalmijn, 2011). Better labour market opportunities for young, highly educated people, for example, would make it easier to spot potential mates with a high income potential, which could lead to earlier transition into marriage, especially for optimal matches. Uncertainty over job prospects on the other hand could make the matching process more difficult, as the income potential of potential partners remain unclear, which could result in people marrying at a later age (Oppenheimer, 1988).

Selection effects too could play an important role in the association between educational assortative mating and fertility. If people's preferences for having children are related to their preferences for finding a partner with a given level of educational attainment, it would lead to a statistical association between educational assortative mating and fertility, even if the two are not directly causally related. If women who prefer to have a lot of children, for example, prefer to marry a man with more education than themselves, this would result in higher fertility levels for

hypergamous couples without hypergamy itself being the reason. Conversely, if women who prefer a career in the labour market over childbearing put a higher value on education, they will be more likely to end up in highly educated homogamous marriages or in hypogamous marriages (if they marry at all). Consequently, those types of couples would have lower fertility levels. This selection effect could furthermore be reinforced by the fact that education increases a person's bargaining power, not only because of the higher income potential associated with better education, but also because someone with a higher education will be more comfortable in dealing with all kinds of administrative and institutional structures (Doss, 2008). Highly educated women would therefore be better equipped to weigh on child bearing decisions.

The association between educational assortative mating and fertility itself may of course also be subject to change given the changing significance of male and female education, even during the Baby Boom era itself. The literature on the association between educational assortative mating and fertility today emphasizes the role of educational homogamy in providing marital stability, which has a positive effect on fertility (Bauer & Jacob, 2009; Huber & Fieder, 2011; Krzyżanowska & Mascie-Taylor, 2014). Recently, educational homogamy has been the dominant outcome of partner search, either because people prefer partners with similar characteristics, or because they prefer partners with the highest income potential (Kalmijn, 1994; 1998; Mare, 1991). Given that gender roles were different in Baby Boom era, it is likely that things were different in those days. Education was only starting to emerge as an important factor in partner search, and women's labour market participation and contribution to the household budget were at a historical low (Lambrechts, 1979; Vanhaute, 1998). In fact, women were often supposed to leave the labour force once they got married (Witte, De Groof, & Tyssens, 1999). Catholic and socialist unions viewed the fact that for many families, the wife's labour was no longer necessary to complement the household budget, as an important social realization (Vandebroek, 2003). Even in teaching, typically the professional field that was feminized very early on, women were obligated to quit their job in Catholic schools when they got married until as late as 1963 (Depaepe, Lauwers, & Simon, 2004). Policies to increase gender equality were installed relatively late in Belgium. Women obtained even the right to vote in the general elections only in 1948. Marital power of the husband over the wife was only eradicated in 1958 (Coenen, Keymolen, & Smet, 1991). The wage gap between women and men was very large. In 1947, women made less than 60% of what men made, both for blue- and white-collar workers (NIS Statistisch Jaarboek 1954, own calculations). By 1960, relative wage of women actually decreased to 55% for blue-collar workers and even less than 50% for white-collar workers (Belgische Econmische Statistieken 1950-1960, own calculations). Female labour market participation decreased from 30% to less than 20% between 1910 and 1947. Therefore, it looks like the income potential of the wife was considered much less important for marriage than the husband's income potential.

We assume that while the sexual division of labour and the male breadwinner norm became stronger (Janssens, 1997), hypergamy became the union type which provided an environment

most conducive to childbearing and -rearing. The husband could take advantage of his higher education, enjoying good labour market conditions: low unemployment for the relatively highly educated, increasing wages and an appreciating value of schooling (Cassiers & Solar, 1990; Van Der Wee, 1987), while the wife, whose opportunity cost for staying home was relatively low once she was married given the low demand for female labour, could dedicate herself to taking care of children. This was reinforced by the kind of timing and selection effects pointed out above. Women with a desire to have children may have preferred a hypergamous match with a high-earning husband and may have preferred to marry as soon as possible. The growing importance of education might have made it easier for men to signal income potential at a relatively young age, thus making this hypergamous match easier to make. Such unions could consequently be formed at a younger age and could thus potentially lead to higher fertility.

Highly educated homogamous couples might have profited from similar specialization strategies (Becker, 1981), however, due to higher opportunity costs for having children for the wife given her higher education and due to selection effects, their fertility levels are likely to have been slightly lower than the fertility levels of hypergamous couples.

In hypogamous marriages, the relatively low income potential of the husband meant that the marginal utility of his wife's labour was comparatively higher, and her opportunity cost for having children was consequently considerably higher. As a result, hypogamous couples are likely to have had lower fertility levels than homogamous and hypergamous couples. This could be reinforced by timing and selection effects: hypogamous couples tend to get married on average at a later age (Nomes & Van Bavel, 2015) and might have been more attractive to people who were less eager to have children. Moreover, if hypergamy became a social norm in the Baby Boom era, it seems likely that people who adhered to this norm, tended to adhere to dominant family norms in general. Conversely, people in non-normative, hypogamous unions could be expected to be more likely to deviate from other family norms, too, including the emerging two-child norm (Van Bavel et al., 2015). If so, hypergamous couples would be more likely to have two children, and hypogamous couples would be more likely to remain childless or have just one child.

Lastly, homogamous couples where both partners are low-educated, while having lower opportunity costs for having children, had a limited income potential at a time when parental investment was strongly increasing due to the growing importance of education, which might have become more and more detrimental to their fertility levels. Moreover, as with hypogamous couples, since the income potential of the husband was limited, the contribution to the household budget of the wife was more important and her opportunity cost for having children was higher. On the other hand, poorly educated people are likely to marry earlier and to value quantity over quality regarding their offspring (Becker & Lewis, 1974), which could offset the negative effects of their education on fertility.

All in all, among couples with at least one highly educated partner, we expect hypergamous couples to have to highest fertility levels during the Baby Boom era, closely followed by homogamous couples. We expect hypogamous couples to have lower fertility levels. Couples were both partners are low-educated are expected to have higher fertility than hypogamous couples, but it is less likely that their fertility levels exceed those of hypergamous and highly educated homogamous couples as well.

Data and methods

To investigate whether changes in patterns of assortative mating are indeed associated with changes in fertility patterns, we investigate marital fertility based on retrospective information in the Belgian censuses of 1981 (Willaert & Deboosere, 2008) and 2001 (Deboosere & Willaert, 2004). The census of 1981 is used for couples were the wife was born between 1910 and 1939, the census of 2001 is used for married women born between 1940 and 1959. Although these censuses contain rich information on education and on marriage- and childbearing histories, there are some limitations given the retrospective nature of the data (Van Bavel, 2013). First of all, sometimes the educational information on either the husband or wife is missing, especially in the census on 2001, which reduces the number of couples we can take into consideration from about 2.7 million to 2.5 million. Second and more important, we can only link husbands and wives with each other if they still live together at time of the census. If by this time a woman is widowed, divorced or separated from the man with whom she had (some) of her children, we cannot link them and they are excluded from the analysis. As a result, of the 2.5 million potential couples, we have to exclude about 20% (see Table 1).

Table 1: Overview of the number of potential and matched couples by birth cohort.

Birth cohorts	Age at time of census	Ever married women	Linked couples	% excluded
1910-1914	67-71	217,380	121,086	44.3%
1915-1919	62-66	166,272	112,651	32.2%
1920-1924	57-61	267,635	209,044	21.9%
1925-1929	52-56	268,775	229,087	14.7%
1930-1934	47-51	274,946	246,087	10.5%
1935-1939	42-46	256,899	234,753	8.6%
1940-1944*	57-61	213,382	166,244	22.1%
1945-1949*	52-56	278,631	223,672	19.7%
1950-1954*	47-51	289,922	235,135	18.9%
1955-1959*	42-46	304,317	252,474	17.0%
TOTAL		2,538,159	2,030,481	20,0%

* Based on the census of 2001

Some bias due to selection effects with regards to mortality is unavoidable, given the social gradient of mortality (Gadeyne & Deboosere, 2002). If there is furthermore a link between divorce and assortative mating, which is quite plausible (Blossfeld, 2014; Frimmel, Halla, & Winter-Ebmer, 2013), divorce could also introduce some bias. This is especially the case for the census of 2001, which has information on cohorts among which divorce had become much more common. This explains the percentage of excluded couples is much higher among cohorts born between 1955 and 1959, who were aged 42 to 46 at the 2001 census, compared to cohorts born between 1935 and 1939 who had the same age at the time of the 1981 census.

We have validated our data by calculating fertility rates, mean age at marriage and educational distributions and comparing the results to official statistics provided by Statistics Belgium (see Figure 1 for the Total Fertility Rate). Moreover we compared fertility rates of women who were selected out of our dataset with our results. While the numbers diverge more for older cohorts, the census based calculation fit the official data to the extent that we are confident of using the censuses starting with cohorts born in 1910.

Educational attainment was grouped into five categories: university, tertiary non-university, higher secondary, lower secondary and at most primary education. To analyse these data, we use measures of marital fertility. We firstly compare cohort total marital fertility (number of children per married woman for a certain birth cohort) of groups with different assortative mating outcomes. More specifically, we compare couples where both partners are low-educated (at most lower secondary), with couples where at least one partner has a higher education (at least higher secondary). Among the latter, we distinguish between homogamous, hypergamous and hypogamous cases. Secondly, we have a look at the marital fertility levels of each particular combination of educational attainment of husband and wife.

We pair this with an event history model approach. We apply a Cox proportional hazard model which estimates the hazard rate of having a child. A proportional hazard model is quite flexible given its unspecified baseline hazard (Boyle & Starr, 1985; Mills, 2011). In such a model, the hazard rate at time *t* or the fertility risk a couple experiences at time *t* is explained by a non-parametric baseline hazard $h_0(t)$ which is subject to the influence of independent variables $X = (X_1, X_2, \ldots, X_n)$.

$$\mathrm{h(t|X)} = \mathrm{h_0}(t)\ \exp(\sum_{i=1}^{n} X_i \beta_i)$$

Firstly, we fit four models of first births. Time in these models is marriage duration in years, meaning that T_0 is the first year of marriage. The models estimates the risk for having a child that a couple experiences *t* years after they married, given that they did not have a child yet. The first model includes indicators of assortative mating type but excludes birth cohort and age at marriage. The second model adds the birth cohort of the wife as a categorical independent variable, the third model adds age at marriage of the wife. The fourth model controls for region.

Secondly, we fit models for second births, third births and fourth births, which are conditional on having had a first, second and third child respectively. Time in these models is the number of years since the last birth, meaning that T_0 is the year of the previous birth.

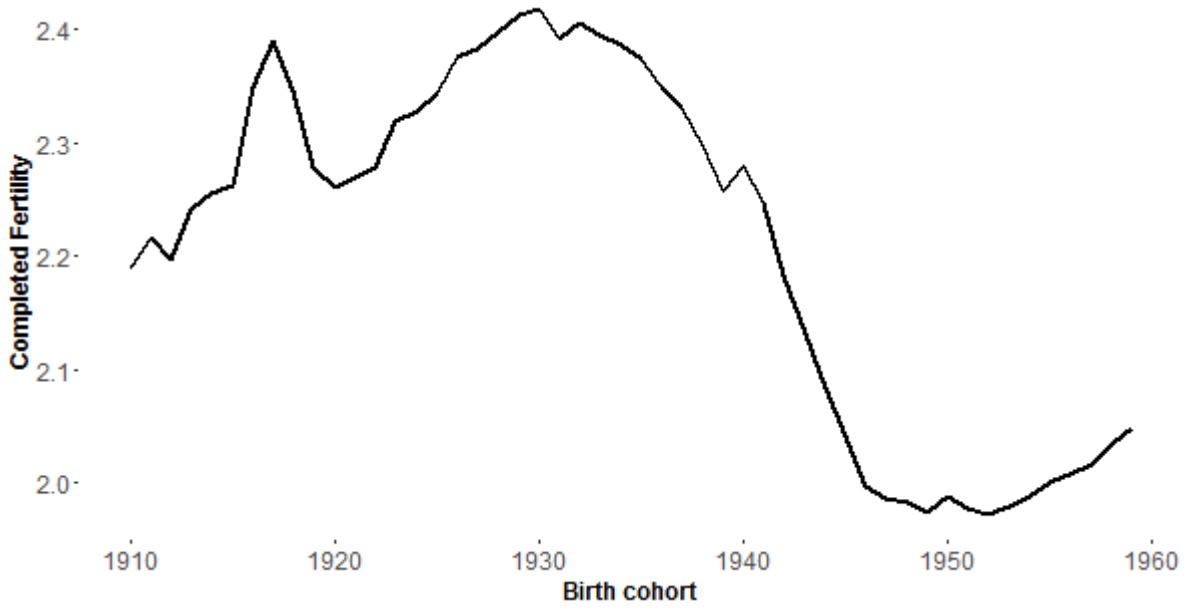
Thirdly, we fit models for first, second, third and fourth births with absolute educational attainment of both husband and wife as the main independent variables, and we include the interaction between husband's and wife's educational levels as well as control variables for birth cohort and region.

Since we are using full population data rather than just a sample, our interpretation of the results focuses on the sizes of the differences and associations. Sampling theory does not apply, so we do not carry out tests of statistical significance.

Results

Figure 5 displays the general trend of cohort marital fertility between 1910 and 1960. As more and more people got married during the Baby Boom years (Nomes & Van Bavel, 2015), these marital fertility levels were applicable to a growing share of the population. This already explains a substantial part of the Baby Boom. At the same time, Figure 5 shows that marital fertility itself increased as well, more precisely between the cohorts born in the 1910s and the cohorts born in the 1930s. This means that either less married couples remained childless, or more married couples had more than one child, or both.

Figure 5: Cohort marital fertility, birth cohorts 1910-1959

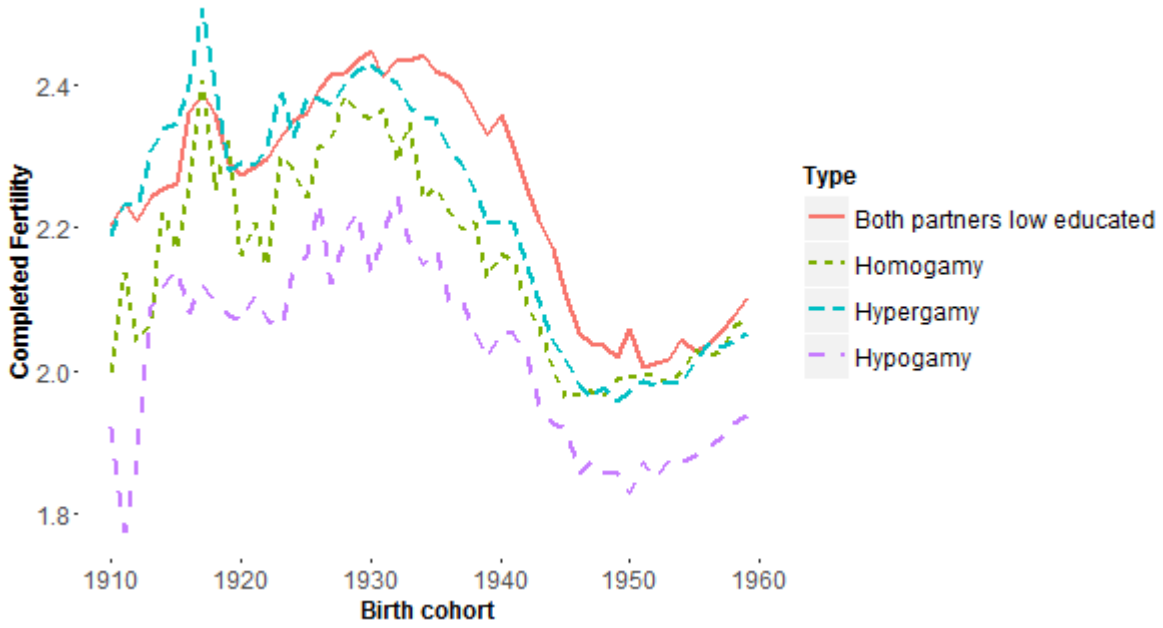


Source: Belgian censuses of 1981 and 2001, own calculations.

Figure 6 charts cohort marital fertility by each educational assortative mating type. On the whole, couples where both partners are poorly educated have the highest fertility. Among couples where at least one of the partners is highly educated, educationally hypergamous couples have consistently the highest fertility. Among the oldest cohorts, they even have more children than poorly educated couples. This is consistent with our expectations. The fertility of highly educated homogamous couples remains well below the fertility of hypergamous ones in all birth cohorts, only to overtake them towards the youngest cohorts, which might point to an evolution towards the contemporary situation where homogamy is positively associated with fertility.

Hypogamous couples clearly have the lowest fertility levels. Among the younger cohorts born in the 1940s and 1950s, there is some convergence between homogamous, hypergamous and low-educated couples, but the fertility levels of hypogamous couples remain well below the fertility levels of the others. As we have seen, the prevalence of hypergamy among these couples is on the decline, while hypogamy is becoming more common and even surpasses hypergamy among cohorts born at the end of the 1950s. This shift towards hypogamy is therefore a contributing factor to the Baby Bust.

Figure 6: Assortative mating and cohort marital fertility, birth cohorts 1910-1959



Source: Belgian censuses mf 1981 and 2001, own calculations.

In Table 2, we look at mean completed marital fertility of all particular combination of the educational level of the husband and the educational level of the wife. On the diagonal we have homogamous couples, to the left of the diagonal we have hypogamous couples and to the right we have hypergamous couples. In general, fertility goes down when moving down or to the left in the table, and goes up when moving up or to the right in the table. In the bottom row, we see the fertility levels of university-educated women, depending on the educational level of their

husbands. Those university-educated women married to a man with at most a primary degree have the lowest fertility, those married to a man who also had a university degree have the highest fertility. In other words, the more the wife's education exceeds the husband's, the lower the fertility observed in those hypogamous marriages.

In the column most to the right, we look at university-educated men, who have the highest fertility levels, regardless of the educational attainment of their wives. In fact, university-educated men married to women with a tertiary non-university degree exhibit the highest fertility, while more prolific cases of hypergamy have slightly lower fertility. This suggests that the higher fertility associated with hypergamy we saw in Figure 6 is due to the effect of the absolute educational level of the husband, rather than of the combination of husband's and wife's educational attainment.

Among hypogamous women a combination between a woman with a non-university tertiary degree (teachers and nurses, for example), and a husband with a higher-secondary degree (including technical fields) yields the highest fertility. This could be explained by the fact that some forms of secondary education (technical schools) and non-university tertiary education ("normal schools" for teachers) are not really that different in level or prestige, and so these might not represent cases of hypogamy in terms of prestige and earning potential.

Table 2: Mean of marital fertility of all birth cohorts for all possible combinations of his and her education.

Education husband / Education wife	At most primary	Lower secondary	Higher secondary	Tertiary non-university	University
At most primary	**2,47**	2,15	2,13	2,23	2,35
Lower secondary	2,19	**1,98**	2,00	2,08	2,35
Higher secondary	2,03	1,88	**1,96**	2,04	2,38
Tertiary non-university	1,95	1,98	2,07	**2,15**	2,40
University	1,81	1,80	1,98	2,07	**2,37**

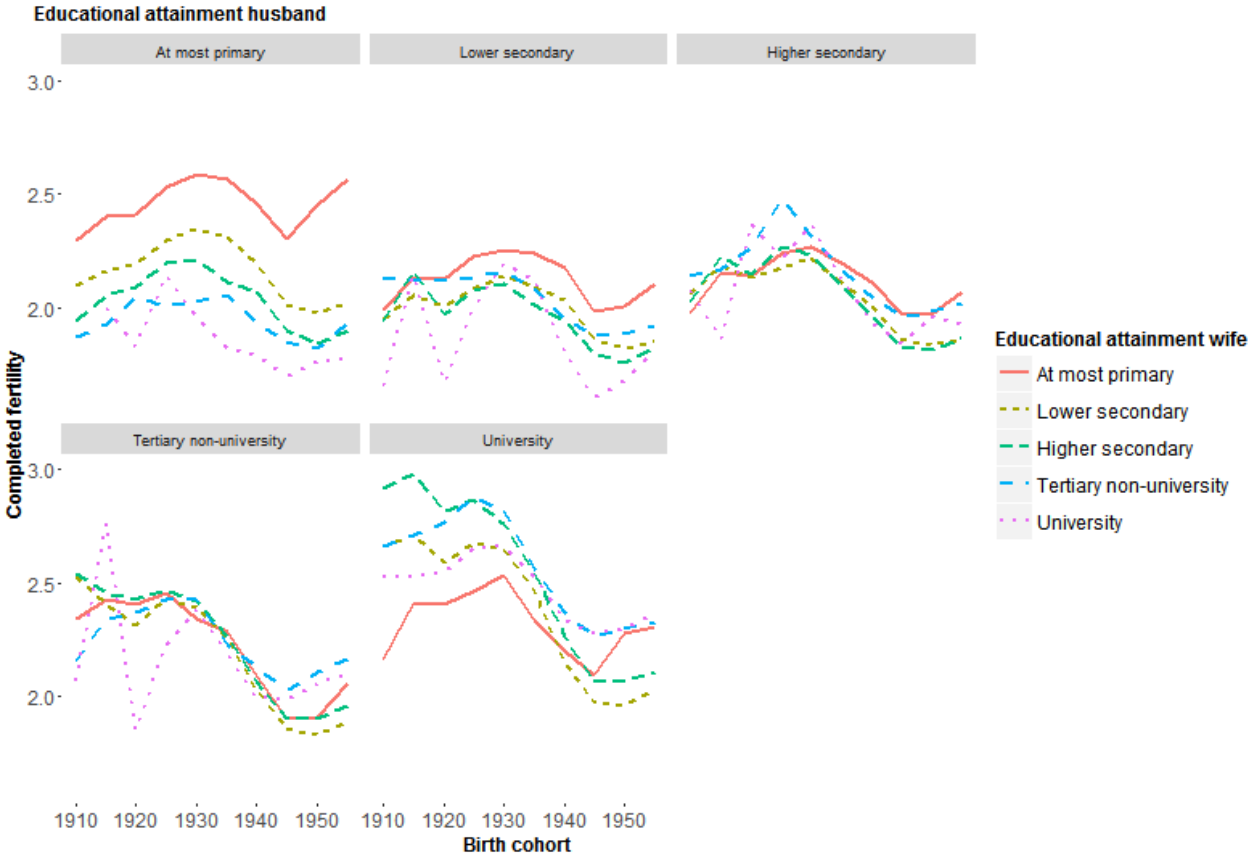
Source: Belgian censuses of 1981 and 2001, own calculations.

In Figure 7 the cohort trends in marital fertility for all these particular combinations of husband's and wife's education are shown. We see clearly that women's education matters most when their husbands have at most a primary degree. From the bottom right graph, it is clear that the educational attainment of women married to university-educated men did matter, at least for the older cohorts. Among these cohorts, poorly educated women married to university-educated men have a much lower fertility than better educated women. This is somewhat surprising, as we would expect that the higher the educational level of the husband, the higher his income potential, and therefore the lower the importance of the income potential (and educational level) of the wife. Nevertheless, women married to men with a university degree who have a non-university tertiary degree like nurses or teachers, and who consequently have a decent income potential, have more children than women married to men with a university degree who have for

example only primary education. As we have seen, this might be explained by the fact that these women had to stop working after getting married, which meant that their opportunity cost for having children, once married, is small, but their opportunity cost for getting married was rather big, which could result in important selection effects.

Figure 7 shows in general that highly educated women have considerably higher fertility when married to even higher educated men. For example, a woman with a non-university tertiary degree born in the 1920s and in a hypogamous union had on average a completed fertility between 2.0 and 2.4 children, depending on the educational level of her husband. However, a similarly educated woman married to a university educated man had an average fertility of more than 2.8 children.

Figure 7: Cohort marital fertility by all possible combinations of his and her education, birth cohorts 1910-1959



Source: Belgian censuses of 1981 and 2001, own calculations.

By comparing these fertility levels with the fertility levels of all married women in the censuses, we find that fertility is overestimated by 0.05 to 0.1 among women born in the 1910s, and this overestimation is positively associated with educational attainment. This suggests that the fertility levels of hypogamous couples in particular are actually even lower than the ones we found. For younger cohorts, the differences are all less than 0.05, although still slightly positively associated with educational attainment. This is no surprise, given the fact that our results show

that highly educated women have lower fertility when married to low educated men, who have higher mortality risks and are consequently more likely to be excluded due to the fact that they died before the time of the census (Gadeyne & Deboosere, 2002).

To disentangle the effects of some of the determinants of the fertility levels of different educational assortative mating types, we now turn to the results of our event history models. Table 3 reports the estimated hazard ratios for three models of first births. Model 1a shows that, overall, couples where both partners are poorly educated (i.e., the reference category) have the highest first birth rates, although the difference with hypergamous couples is negligible. Hypogamous couples have the lowest first child rates: the hazard ratio is about 6% lower compared to low-educated couples. When we include the birth cohort indicators in Model 1b, the net difference between couples where both partners are poorly educated and couples where at least one partner is highly educated turns out to be larger. This could be explained by the fact that couples with at least one highly educated partner became more common among younger cohorts, who experienced higher fertility in general. For example, since hypergamy was much more prevalent among generations born in the 1940s, which were the same generations who experienced the highpoint of the baby boom, not including a birth cohort variable would lead to an overestimation of the positive association between fertility and hypergamy as such.

Table 3: Hazard ratios of having a first child based on a Cox proportional hazard model (time = marriage duration)

	Model 1a	Model 1b	Model 1c	Model 1d
Assortative mating type				
Both partners low-educated (ref.)				
Homogamy (H=W)	0.946	0.924	0.999	1.008
Hypergamous (H>W)	0.991	0.968	1.015	1.022
Hypogamous (H<W)	0.936	0.914	0.989	0.991
Birth cohort				
1910s (ref.)				
1920s		1.129	1.083	1.081
1930s		1.268	1.157	1.149
1940s		1.290	1.149	1.134
1950s		1.161	1.010	0.995
Age at Marriage				
< 21 (ref.)				
21-25			0.819	0.816
26-30			0.766	0.766
30-35			0.471	0.474
> 35			0.028	0.029
Region				
Brussels (ref.)				
Flanders				1.240

Wallonia				1.225

After including the wife's age at marriage in Model 1c, the differences between union types become much smaller. After controlling for marriage timing, hypergamy is associated with a 1 % higher first birth rate compared to low-educated homogamous couples. These results confirm that fertility is negatively associated with age at marriage: the higher the age at marriage, the lower the rate of transition to parenthood. The higher fertility of the poorly educated couples we found in Model 1a and 1b is apparently largely explained by their younger age at marriage. The cohort hazard ratios in Model 1c are lower than they were in Model 1b, pointing once again to the fact that the general decrease in age at marriage played an important role in the Baby Boom.

Including region as an independent variable in model 1d does hardly change the hazard ratios in a meaningful ways. The difference between low educated and other homogamous couples changes sign (from 0.999 to 1.008), but it remains very small.

Table 4: Hazard ratios of having a first, second, third and fourth child based on Cox proportional hazard model (time = marriage duration)

	Model 1c	**Model 2**	**Model 3**	**Model 4**
	1st birth	2nd birth	3rd birth	4th birth
Assortative mating type				
Both partners low-educated (ref.)				
Homogamy (H=W)	0.999	1.239	0.959	0.781
Hypergamous (H>W)	1.015	1.188	0.976	0.849
Hypogamous (H<W)	0.989	1.066	0.867	0.790
Birth cohort				
1910s (ref.)				
1920s	1.083	1.057	1.002	0.967
1930s	1.157	1.186	0.967	0.843
1940s	1.149	1.089	0.629	0.508
1950s	1.010	1.059	0.544	0.450
Age at Marriage				
< 21 (ref.)				
21-25	0.819	1.022	0.902	0.834
26-30	0.766	1.115	0.939	0.833
30-35	0.471	0.857	0.705	0.648
> 35	0.028	0.194	0.197	0.397

Table 4 reprints the estimates from Model 1c, next to the results from the models for second, third, and fourth births that include the same explanatory variables. It is striking that for second births, hypergamous and highly educated homogamous couples exhibit higher fertility compared to hypogamous couples as well as compared to poorly educated couples. This suggests that the two-child norm was indeed strongly adhered to in the former types of couples. However, we have to be wary of selection effects: as we only consider people who have had a first child already in

these models, we may select a particular group of people among couples with at least one highly educated partner (Kravdal & Rindfuss, 2008).

For the parities beyond the second child, couples with at least one highly educated partner have lower rates. Moreover, third and fourth births are less likely among younger birth cohorts than among the eldest cohorts, pointing to the fact that the increase of marital fertility during the Baby Boom was rather a matter of higher first and second birth rates. All of this suggest that the higher fertility of couples where both partners are poorly educated, as shown in our descriptive results, is due to their higher chances of transitioning to higher parities in combination with the fact that they marry younger, on average, than couples where at least one of the partners is relatively highly educated.

Table 5 shows the result of our last set of survival models, where we use absolute educational levels and the interactions between absolute educational levels instead of our educational assortative mating indicator. Here the strong positive effect of education of the husband is confirmed. When we have a look at the interaction effects, we see that given both partners absolute education level, hypogamous combinations still have a lower likelihood of entering parenthood compared to other combinations. Hypergamous combinations on the other hand are not more likely to have first or subsequent births, pointing once again to the conclusion that the higher fertility of these couples is explained by the absolute education level of the husband.

Table 5: Hazard ratios of having a first, second, third and fourth child based on Cox proportional hazard model (time = marriage duration)

	Model 1e	**Model 2e**	**Model 3e**	**Model 4e**
	1st birth	2nd birth	3rd birth	4th birth
Education Wife				
At most primary	1,058	0,949	1,175	1,249
Lower secondary	1,039	0,941	1,035	1,072
Higher secondary (ref.)				
Tertiary non-university	1,040	1,244	1,110	0,958
University	0,921	1,304	1,248	1,012
Education Husband				
At most primary	1,032	0,902	1,118	1,222
Lower secondary	0,996	0,893	0,954	1,017
Higher secondary (ref.)				
Tertiary non-university	1,019	1,154	1,056	0,966
University	1,131	1,485	1,437	1,223

Table 5: Hazard ratios of having a first, second, third and fourth child based on Cox proportional hazard model (continued)

	Model 1e	Model 2e	Model 3e	Model 4e
	1st birth	2nd birth	3rd birth	4th birth
Birthcohort				
1910s (ref.)				
1920s	1,134	1,075	1,033	1,000
1930s	1,274	1,204	1,020	0,904
1940s	1,298	1,079	0,676	0,576
1950s	1,169	1,042	0,592	0,523
Region				
Brussels (ref.)				
Flanders	1,265	1,234	1,131	0,955
Wallonia	1,263	1,206	1,167	0,997
Education Wife * Education Husband				
At most primary (H)				
At most primary (W)	1,041	1,155	1,048	1,017
Lower secondary (W)	1,020	1,100	1,060	1,015
Higher secondary (W) (ref.)				
Tertiary non-university (W)	0,882	0,929	0,893	0,985
University (W)	0,900	0,893	0,809	0,990
Lower secondary (H)				
At most primary (W)	1,017	1,058	1,050	1,023
Lower secondary (W)	0,998	1,034	1,064	1,042
Higher secondary (W) (ref.)				
Tertiary non-university (W)	0,965	0,973	0,986	1,043
University (W)	0,941	0,962	0,859	0,981
Higher secondary (H) (ref.)				
Tertiary non-university (H) (ref.)				
At most primary (W)	1,004	0,973	0,996	1,044
Lower secondary (W)	0,995	0,977	0,978	1,060
Higher secondary (W) (ref.)				
Tertiary non-university (W)	0,992	0,952	1,026	1,031
University (W)	1,005	0,992	1,013	0,959
University (H)				
At most primary (W)	0,908	0,942	0,840	0,885
Lower secondary (W)	0,953	0,957	0,913	0,973
Higher secondary (W) (ref.)				
Tertiary non-university (W)	0,954	0,939	0,973	0,967
University (W)	0,991	0,914	0,933	0,936

Conclusion

This paper has investigated how patterns of assortative mating are associated with patterns of marital fertility. We have focussed on Belgium, which of course has its own particular socio-economic and political context. Belgium certainly was not on the forefront of gender equality, as is evident by the fact that even in the 1950s, married women were often obliged to give up their jobs. Compared to most neighbouring countries, the expansion of education was lagging behind in its first stage, possibly due to the late introduction of compulsory education, but caught up in the second stage (when secondary education became the norm) and Belgium became a vanguard country in Europe during the last stage (towards tertiary education, see Barro & Lee, 2001). However, the differences with other European countries were rather small, compared to the differences between continental Europe and the Anglo-Saxon countries. Patterns of educational assortative mating were found to be rather similar in Belgium, Germany and Norway for example (Birkelund & Heldal, 2003; Nomes & Van Bavel, 2015; Schmidt & Winter, 2009), but somewhat different in the United States (Mare, 1991). Consequently, we expect that other European countries may exhibit similar patterns as the ones reported for Belgium in this paper, but the situation was perhaps different in Anglo-Saxon countries .

Among the birth cohorts who produced the Baby Boom, we found that marital cohort total fertility increased from 2.2 children per couple to 2.4 children per couple at its peak, which was among generations born in the 1930s. Earlier research has pointed out that the Baby Boom went together with a shift towards heterogamy, and especially towards hypergamy, and that the Baby Bust coincided with the start of a shift to hypogamy. Our results show that couples where both partners are poorly educated experienced the highest fertility among most of the Baby Boom producing birth cohorts. Hypergamous couples were not far behind, and their fertility levels even exceeded the levels of the low-educated couples among some birth cohorts. Highly educated homogamous couples had slightly lower fertility than hypergamous couples. Hypogamy was clearly associated with lower fertility, even among the younger cohorts, born in the 1950s. The increasing prevalence of hypogamy during the Baby Bust could thus be one factor contributing to the fertility decline.

We found a clear educational gradient of fertility among men in both hypergamous and hypogamous marriages. The higher fertility rates associated with hypergamous couples are mostly explained by the husband's absolute educational level. For their wives, there was no such gradient, except among hypergamous couples from the older cohorts where the husband had a university degree. In those type of hypergamous marriages, relatively highly educated women were not only having more children than lower educated women with a university educated husband, but they were also having more children than similarly educated women in a

hypogamous marriage. It seems that while in general a relatively high education for women lead to lower fertility, this was not the case when they married a man who was at least as highly educated as she was. Consequently, since hypergamy became more prevalent during the Baby Boom, this might have weakened the pattern of low fertility for highly educated women. Educational assortative mating may therefore explain at least part of the weakening educational gradient reported for this period in an earlier Belgian study (Van Bavel 2014).

Survival analysis shows that low educated couples had the highest first birth rates. However, when controlling for marriage timing, the differences between the first birth rates of low educated couples and the first birth rates of couples where at least one partner is highly educated almost completely disappear. The higher first birth rates for low educated couples are thus mostly the result of earlier marriage. Among couples where at least one partner is highly educated, marriage timing also accounts for a big part of the differences between hypergamous, hypogamous and homogamous couples. However, some variance is still left over after controlling for it.

Next, our analysis showed that hypergamous marriages resulted in the highest second births rates even after controlling for marriage timing. For second births, all couple types have higher rates than couples where both partners are poorly educated, including the hypogamous ones. Controlling for marriage timing does not alter these ratios much, which means that differences in second birth rates between different types of assortative mating were not due to differences in marriage timing. Poorly educated couples were however more likely to make the transition to third and fourth births. For those couples who have already resolved the question of whether to have children and have made the transition to parenthood, the majority will go on to have a second birth, since the two-child norm seems to have been very strong.

In general, these results confirmed our expectations based on theoretical considerations. Hypergamy might have been strongly associated with a strong sexual division of labour during the Baby Boom era, allowing husbands and wives to specialize in breadwinning and homemaking respectively. Hypogamy on the other hand might have been at odds with these gender roles. Hence, it was associated with lower fertility. Selection effects could have reinforced these patterns, as women with a preference for having children might have more often chosen a path leading to hypergamy, while women with professional ambitions of their own might have focused more on their own education and might have ended up more often in hypogamous marriages.

To better understand the association between the combination of his and her educational attainment on the one hand and marital fertility on the other, it would be interesting to go one step further and see to what extent it is indeed the inclination to mate assortatively that is producing our results and to what extent it is rather the changes in the marginal distributions of

educational attainment. Moreover the role of selection effects should be sorted out in future research.

It is clear that both the education of the husband and the wife, and the particular combinations of their educational attainment resulting from educational assortative mating, were determinants of marital fertility patterns during the Baby Boom and Baby Bust. The influence of one partner's education on marital fertility was dependent on the education of the other partner. Education mattered, especially if the partner was low-educated. The shift to hypergamy, which was well adapted to prevailing gender roles, contributed to the Baby Boom, as highly educated men married to lower educated women did not experience a negative effect of their increased income potential. Highly educated women on the other hand experienced considerably lower fertility when married to a lower educated partner. Even though these kind of hypogamous marriages where becoming increasingly more prevalent throughout the 20th century, gender roles seem to have lagged behind. The result was lower fertility for these kind of couples, which contributed to the Baby Bust.

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